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Does the Perception of Spatial Relations Affect the Response Time for Abstract Concepts?

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Introduction

Many studies have demonstrated that a perception-based knowledge representation approach can account for the representation of concrete concepts (e.g., *table*). However, only a few studies have been carried out to test whether this approach can explain the representation of abstract concepts (e.g., *prejudice*) as well. Barsalou (1999) assumed three aspects that make the representation of abstract concepts within a perception-based knowledge representation framework possible: a) the situation as the background for understanding, b) selective attention, and c) introspective states and processes. Richardson, Spivey, Barsalou, and McRae (2003) showed that the representation of abstract concepts can be ascribed to spatial relations that were derived from perceptual experiences. In the present study it was hypothesized that a spatial relation (difference vs. sameness) is extracted during perception of abstract concepts and stored in long-term memory. A priming method was applied to test whether the perception of simple image schemas characterized by certain spatial relations facilitate the response to the corresponding abstract nouns.

Method

Fifty-one persons participated for monetary compensation or psychology course credits.

Ten abstract nouns and their corresponding schematic drawings (image schemas) were obtained through norming studies. For half of these nouns, the spatial relation of sameness was shown to be crucial: *agreement, analogy, arrangement, harmony,* and *standard.* The other nouns were characterized by aspects of difference: *advantage, diversity, exception, preference,* and *separation.* Image schemas reflected the appropriate spatial relation.

Each trial in the experiment consisted of a prime and a target phase. In the prime phase, image schemas were accompanied by sentences that either focused on the critical relation in the drawing (focus sentences) or distracted from this relation (nonfocus sentences). To make sure that participants process the image schemas, their task was to decide whether the drawing was described correctly or not. In the target phase, participants saw two abstract nouns that either matched the previous image schema with its spatial relation or not (matching vs. nonmatching condition). The two nouns were written in distinct fonts and participants were required to indicate as quickly as possible whether they are identical or not.

Results & Discussion

Response times were subjected to a 2 (focus vs. nonfocus sentences) x 2 (matching condition) repeated-measures ANOVA separately for each spatial relation. A significant interaction was revealed for abstract nouns on the difference relation, $F(1,47)=4.293$, $p=.044$ (see Figure 1). All other effects were not significant, Fs≤ 1.813, ps$\geq .185$.

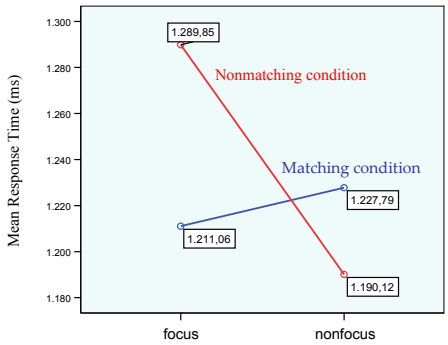


Figure 1: Mean response times for nouns on the spatial relation of difference

Faster response times occurred in the matching condition than in the nonmatching condition when the image schema was described by a focus sentence, $t(47)=-1.959$, $p=.028$ (one-tailed). Response times were slower in the nonmatching condition when a focus sentence, compared to a nonfocus sentence, described the image schema, $t(47)=2.011$, $p=.025$ (one-tailed). No significant difference was detected in the matching condition between focus and nonfocus sentences, $t(47)=-0.379$, $p=.706$.

It seems that for certain abstract concepts a rather schematic knowledge in the form of simple spatial relations exists that was extracted from the perception of many situations in which the abstract concept was the center of attention.

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